

Shouichi MIYAWAKI et al., S.N. 10/564,249
Page 2

Dkt. 1141/75707

Listing of Claims

The following listing of claims will replace all prior versions, and listings, of claims in the subject application:

Claim 1 (currently amended): A magnetic resonance imaging method comprising:

- (1) a step for applying one or more pulses of the gradient magnetic field sequentially and detecting nuclear magnetic resonance signals for reconstructing magnetic resonance images;
- (2) a step for calculating a residual magnetic field being generated in the magnetic device by the applied gradient magnetic field on the basis of the residual magnetic field response function that represents the relation between the strength of the applied gradient magnetic field and the strength of the residual magnetic field being generated by the applied gradient magnetic field; and
- (3) a step for correcting the residual magnetic field calculated in the step (2) along with the application of each pulse of the gradient magnetic field;
- (4) a step for updating the residual magnetic field response function in accordance with the strength of each pulse of the applied gradient magnetic field along with the application of the gradient magnetic field pulses,

wherein

the calculation in step (2) is executed to calculate the strength of the residual magnetic field upon every application of the gradient magnetic field pulse in the process of executing the imaging sequence, and

Shouichi MIYAWAKI et al., S.N. 10/564,249
Page 3

Dkt. 1141/75707

the strength of the residual magnetic field calculated in step (2) is used to correct the residual magnetic field in step (3) which changes the strength in accordance with every application of the gradient magnetic field pulse in the process of executing the imaging sequence, and

updating of the residual magnetic field response function in step (4) is executed upon every application of the gradient magnetic field pulse in the process of executing the imaging sequence, and

the calculation of the residual magnetic field in step (2) is executed by using the residual magnetic field response function updated in step (4), and

the residual magnetic field response function, which is used in step (2) and updated in step (4), is stored in a storage means and updated in real time and changes in accordance with every application of the gradient magnetic field pulse in the process of executing the imaging sequence.

Claim 2 (original): A magnetic resonance imaging method according to claim 1, wherein before the steps (1) ~ (4) are performed,

(5) a step for degaussing the residual magnetic field being generated in the magnetic device, and for initializing the residual magnetic field response function to the state after degaussing.

Claim 3 (previously presented): A magnetic resonance imaging method according to claim 2, wherein before steps (1) ~ (5) are performed,

Shouichi MIYAWAKI et al., S.N. 10/564,249
Page 4

Dkt. 1141/75707

- (6) a step for obtaining the residual magnetic field response function after degaussing or after degaussing and applying one or more gradient magnetic field pulses, and for storing it as the calibration data is performed.

Claim 4 (previously presented) : A magnetic resonance imaging method according to claim 1, wherein the correction of the residual magnetic field in step (3) is performed by superposing the correction magnetic field over the gradient magnetic field.

Claim 5 (original): A magnetic resonance imaging method according to claim 4 wherein the superposed and applied correction magnetic field is the gradient magnetic field that has the same axis as the previously mentioned gradient magnetic field.

Claim 6 (original): A magnetic resonance imaging method according to claim 5 wherein the superposed and applied correction magnetic field includes components other than the gradient magnetic field that has the same axis as the previously mentioned gradient magnetic field.

Claim 7 (previously presented) : A magnetic resonance imaging method according to claim 1, wherein the correction of the residual magnetic field in step (3) is performed by varying the strength of the gradient magnetic field for applying to correct the residual magnetic field of which its strength is previously calculated.

Shouichi MIYAWAKI et al., S.N. 10/564,249
Page 5

Dkt. 1141/75707

Claim 8 (previously presented) : A magnetic resonance imaging method according to claim 3, wherein the residual magnetic field response function is represented by drawing a residual magnetic field response curve on a two-dimensional chart of which the x-axis indicates the applied gradient magnetic field and the y-axis indicates the residual magnetic field being generated by the application of the gradient magnetic field.

Claim 9 (previously presented) : A magnetic resonance imaging method according to claim 8, wherein the updating of the residual magnetic field response function by step (4) includes:

- (7) a step for varying the value of Y, in the residual magnetic field response curve shown in the two-dimensional chart, so that it becomes the same value as calculated in step (2) in the range between zero and the strength of the applied gradient magnetic field pulse.
- (8) a step for drawing the residual magnetic field response curve of the two-dimensional chart so that the value of Y is varied from the value calculated in step (2) with a predetermined gradient in the opposite direction of the applied gradient magnetic field pulse being applied from zero by the value X.

Claim 10 (previously presented): A magnetic resonance imaging method according to claim 9 wherein the two-dimensional predetermined gradient is obtained on the basis of the calibration data stored in step (6).

Shouichi MIYAWAKI et al., S.N. 10/564,249
Page 6

Dkt. 1141/75707

Claim 11 (currently amended): A magnetic resonance imaging apparatus comprising:

a static magnetic field generation means for generating the static magnetic field in the imaging space where the subject is placed;

a gradient magnetic field generation means for applying the gradient magnetic field in the above-mentioned imaging space;

a control means for controlling the application of the gradient magnetic field by the gradient magnetic field generation means;

a storage means for storing a residual magnetic field response function that represents the relation between the strength of the applied gradient magnetic field and the strength of a residual magnetic field being generated by the applied gradient magnetic field;

a calculation means for calculating the strength of the residual magnetic field being generated by the applied gradient magnetic field, by using the residual magnetic field response function and the information of the strength of the applied gradient magnetic field transmitted from the control means;

a residual magnetic field correction means for correcting residual magnetic field having the strength calculated by the calculation means, upon the application of the gradient magnetic field;

~~wherein the magnetic resonance imaging apparatus includes~~

an updating means for updating the residual magnetic field response function stored in the storage means in accordance with the strength of the applied gradient magnetic field along

Shouichi MIYAWAKI et al., S.N. 10/564,249
Page 7

Dkt. 1141/75707

with the application of the gradient magnetic field;

wherein the updating means updates the residual magnetic field response function upon every application of the gradient magnetic field pulse in the process of executing the imaging sequence, and

the calculation means calculates the residual magnetic field upon every application of the gradient magnetic field pulse in the process of executing the imaging sequence by using the residual magnetic field response function updated by the updating means in real time.

Claim 12 (previously presented): A magnetic resonance imaging apparatus according to claim 11 wherein the residual magnetic field correction means comprises:

a correction magnetic field generation means for applying the correction magnetic field.

Claim 13 (canceled).

Claim 14 (previously presented) : A magnetic resonance imaging apparatus according to claim 12, wherein the correction magnetic field is the gradient magnetic field that has the same axis as the previously mentioned gradient magnetic field.

Claim 15 (previously presented): A magnetic resonance imaging method according to claim 14 wherein the correction magnetic field includes components other than the ones of the gradient magnetic field, that have the same axis as the previously mentioned gradient magnetic field.

Shouichi MIYAWAKI et al., S.N. 10/564,249
Page 8

Dkt. 1141/75707

Claim 16 (previously presented) A magnetic resonance imaging apparatus according to claim 12, wherein the correction magnetic field generation means is correction coils.

Claims 17-18 (canceled).

Claim 19 (previously presented): A magnetic resonance imaging apparatus according to claim 11 wherein the residual magnetic field correction means performs the correction by varying the strength of the gradient magnetic field.